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MALAYAN SOILS. I.

By M. Barrowcliff.

The work described in this paper represents the first results obtained in an investigation of the texture and composition of the soils of this country, from which it is hoped to obtain, correlating laboratory observations with field experience, some insight into the causes of fertility and non-fertility, and knowledge of the manurial and cultural requirements.

Of the analyses here given the first three are those of soils of plantations under the control of the Department of Agriculture, and on which experiments are being initiated, whilst the remainder represent outside estate soils concerning which advice was sought for. Considerable importance should be attached to the mechanical analyses, which picture in a way no other method of representation can do the *texture* of the land, and consequently the ease or difficulty with which the roots of the tree are likely to penetrate it and the degree to which it will be naturally aerated.

In order that these may be more easily interpreted the following examples of the mechanical analyses of different types of soils are given, taken from Hall's "The Soil."

	1. Coarse Barren Sand.	2. Fine Sandy Loam.	3. Heavy Clay Loam.	4. Heavy Clay.
Moisture	1.35	1.62	3.08	9.5
Loss on ignition	4.73	3.46	4.22	9.1
Calcium Carbonate	—	0.33	—	0.4
Fine gravel	0.2	0.50	2.8	0.4
Coarse Sand	22.6	15.03	14.1	0.8
Fine Sand	60.8	48.99	31.2	6.4
Silt	4.8	15.26	17.4	18.6
Fine Silt	0.6	3.90	6.9	13.6
Clay	1.76	9.74	18.5	42.2

No. 1 is described as a barren heath, carrying only heather and pine.

No. 2 is a soil of excellent texture, easily worked, and possessing fair retentivity for moisture. It represents land of great fertility for all purposes.

No. 3 is a strong wheat and permanent pasture soil, not too heavy to prevent a good tilth being secured.

No. 4 is a heavy undrained London Clay which will carry nothing but poor pasture.

A notable feature of the soils about to be described is that they contain no gravel or coarse sand, nothing in fact of a greater diameter than 0.5 millimetre.

For this reason those that do not at the same time contain considerable amounts of humus and organic matter are poorly aerated and subject to "caking" on the surface when dry.

EXPERIMENTAL PLANTATION, KUALA LUMPUR.

Mechanical Analysis.	%	*Chemical Analysis.*	%	
Gravel and Coarse Sand	Nil.	Moisture	1.2	Calculated on the dried soil.
Fine Sand (.5 to .05mm.)	61.4	Loss on heating	5.82	
Silt (.05 to .01mm.)	9.2	Aluminium & Iron Oxides	11.82	
Fine Silt (·01 to ·005mm.)	9.4	Calcium Oxide	0.10	
Clay (below .005mm.)	17.7	Potash	0.118	
Humus	2.3	Phosphate (P_2O_5)	0.023	
Calcium Carbonate	Nil.	Nitrogen	0.091	
		Insoluble Matter	81.6	
"Available" Potash		.0057%	soluble in 1% citric acid.	
" Phosphate		.0029%		

This soil is of conparatively good texture, containing sufficient clay and silt to make it retentive of moisture and sufficient sand to keep it open and permit of extensive root development.

The percentages of potash and nitrogen, though lower than the average of other soils examined, are adequate, but in phosphoric acid the deficiency is marked.

As in all the rest of the series the soil is devoid of calcium carbonate.

It is an excellent soil for the purpose of manurial experiments such as are being carried out on it.

CASTLETON ESTATE, TELOK ANSON. (L. Perak.)

Mechanical Analysis.	%	*Chemical Analysis.*	%
Gravel and Coarse Sand	Nil.	Moisture	7.5
Fine Sand	2.4	Loss on heating	12.6

	%		%
Silt	13.5	Alumina	11.65
Fine Silt	31.0	Iron Oxide	4.2
Clay	50.4	Calcium Oxide	0.19
Humus	2.7	Magnesia	0.55
Calcium Carbonate	Nil.	Potash	0.65
		Phosphate	0.051
		Nitrogen	0.248
"Available" Potash		.0096	
,, Phosphate		.0061	

This is an alluvial soil of an extremely heavy type, as seen from the almost total absence of sand and the exceptionally high proportion of clay and fine silt. It is eminently suitable for the carrying out of experiments designed for the purpose of improving the texture, such as the incorporation of green manures, of sand, of limestone, and of deep cultivation. Deep drainage is, unfortunately, not practicable, the natural water level being very near to the surface.

The quantities of plant food present, nitrogen, potash, and phosphate, being good, not to say rich, application of fertilizers is likely to have much less effect than the above-mentioned measures.

GOVERNMENT PLANTATION, PONDOK TANJONG, PERAK.

Mechanical Analysis.	%	*Chemical Analysis.*	%
Gravel and Coarse Sand	Nil.	Moisture	3.4
Fine Sand	28.0	Loss on heating	14.1
Silt	7.6	Alumina	16.3
Fine Silt	16.6	Iron Oxide	4.1
Clay	43.3	Calcium Oxide	0.15
Humus	4.5	Magnesia	0.30
Calcium Carbonate	Nil.	Potash	0.20
		Phophate	0.07
		Nitrogen	0.29
"Available" Potash		.004	
,, Phosphate		.0026	

This also a heavy alluvial soil, of a less pronounced type than the former, but to which it is immeasurably superior in texture. This is due partly to the presence of a fair proportion of sand, and of more humus and organic matter, but mainly in the writer's opinion, to the presence of large numbers of worms, to their action in loosening the soil, making it more pervious to air and quicker to drain, conditions favorable to good root development. Although the amounts of "available" potash and phosphate are low the growth of the trees is magnificent.

This should prove a good soil for manurial and drainage experiments, and should be especially responsive to liming.

ESTATE A. KRIAN DISTRICT.

Mechanical Analysis.	%	*Chemical Analysis.*	%
Grand and Coarse Sand	nil.	Moisture	5.2
Fine Sand	26.3	Loss on heating	16.3
Silt	36.0	Alumina and Iron Oxide	13.3
Fine Silt	21.1	Calcium Oxide	0.35
Clay and humus	16.5	Magnesia	1.0
Humus	3.1	Potash	0.38
Calcium Carbonate	nil.	Phosphate	.093
		Nitrogen	0.34

"Available" Phosphate .0175

Of all yet examined this soil is the best in texture and in the percentages of plant food contained in it, and were it situated sufficiently high above the water table to permit of good drainage would undoubtedly give excellent results. Liming, the measure recommended and being tried, should have a marked effect and the results will be awaited with interest.

ESTATE B. KRIAN (peaty soil).

Moisture	4.9		
Loss on heating	31.8		
Alumina	7.3		
Iron Oxide	1.6	Calcium Carbonate	.04
Calcium Oxide	0.18	"Available" Potash	.015
Magnesia	0.32	,, Phosphate	.043
Potash	0.373		
Phosphate	0.129		
Nitrogen	0.76		

This, being a peaty soil did not lend itself to mechanical analysis. It is richly supplied with plant food and like the previous one mainly requires drainage and liming. Deep ploughing to incorporate more clay with the surface peat would usually be advantageous with a soil of this nature, but in this particular instance the composition of the subsoil is practically the same.

ESTATE C. NEGRI SEMBILAN.

Mechanical Analysis.	%	*Chemical Analysis.*	%
Gravel and Coarse Sand	Nil.	Moisture	6.75
Fine Sand	19.3	Loss on heating	10.7
Silt	10.4	Alumina	16.6

	%		%
Fine Silt	21.7	Iron Oxide	5.55
Clay	46.6	Calcium Oxide	0.15
Humus	2.0	Magnesia	0.46
Calcium Carbonate	.04	Potash	1.30
		Phosphate	.069
		Nitrogen	.20
		"Available" Potash	.0073
		,, Phosphate	.0013

This resembles the Pondok Tanjong soil in its proportions of clay, silt, etc., but is considerably closer in texture, containing less sand and organic matter. Although extremely rich in potash, the "available" amount of this constituent is not large and will be considerably augmented by liming. Nitrogen is plentiful, but "available" phosphate markedly deficient. Application of lime and phosphate and measures, such as surface cultivation, for loosening the soil are indicated in this case.

ESTATE D. COAST DISTRICT, N. SEMBILAN.

Mechanical Analysis.		*Chemical Analysis.*	
	%		%
Gravel and Coarse Sand	Nil.	Moisture	2.5
Fine Sand	13.3	Loss on heating	8.9
Silt	28.7	Alumina	9.8
Fine Silt	21.5	Iron Oxide	4.3
Clay	34.5	Calcium Oxide	0.13
Humus	2.0	Magnesia	0.24
Calcium Carbonate	.04	Potash	0.376
		Phosphate	0.035
		Nitrogen	0.19
		"Available Potash	.009
		,, Phosphate	.0028

This also is of a "heavy" type though superior in this respect to C, having a larger proportion of silt and less clay. Nitrogen and potash are ample in quantity, and, like the Kuala Lumpur soil, it will probably respond best to applications of lime and phosphate. (vide Mr. Spring's paper on "Manurial Experiments," *Agricultural Bulletin*, Dec. 1912.)

GENERAL REMARKS.

From the results thus far obtained it would appear that Malayan soils possess the general characteristics of being rich in humus, and therefore in nitrogen, and of being almost totally lacking in calcium carbonate. Plentiful also are the stores of potash, as is to be expected from the high clay content, and although the "available" amount is

lower than is considered requisite for fertility in temperate climates, this is offset by the greater rate of soil decomposition under tropical conditions.

Phosphate seems a much less certain factor, in two cases being considerably below, in three cases just on or above, and in the remaining two, the Krian soils, decidedly above the minimum amount usually regarded as adequate (.05%).

To determine to what extent the cultivation of rubber is depleting the natural resources of the soil the writer has made estimations of the quantities of the various plant foods removed in the latex, and calculates from them that in producing a crop of 400 lbs. of dry rubber there are removed, per acre per annum, $3\frac{1}{2}$ lbs. of nitrogen, 3 lbs. of potash, and $1\frac{1}{4}$ lbs. of phosphoric acid ($P_2 O_5$).

When it is remembered that an average crop of wheat takes out 41.7 lbs. of nitrogen, 36.5 lbs. of potash, and 20.5 lbs. of phosphoric acid it is seen that the drain on the soil is extremely small although it must not be forgotten that in the cases of potash and phosphate further amounts are stored in the tree. The point of greatest importance however is that there is taking place practically no depletion of the reserve of nitrogen, the most expensive of all the plant foods to replace, and in this respect rubber differs from the majority of other cultivations. It does not follow of course that application of nitrogenous manures may not frequently be beneficial as a stimulus but it would certainly seem that, in general, promotion of natural bacterial nitrate formation by surface cultivation and liming should supply all that the rubber tree requires, practically all the nitrogen thus taken up being returned at the fall of the leaf and seed, to undergo again the cycle of change.

Due regard will of course have to be paid to the risk of loss of nitrogen through excessive nitrate production and leaching from the soil.

Although this investigation is only in its preliminary stages the trend of it indicates the need for experimenting :—

(*a*) On liming, the extent to which burnt lime and limestone can safely and profitably be added.

(*b*) On texture improvement, chiefly by the growing and incorporation of green manures with the soil, there being no practice known to agriculture equal to this for lightening the texture of heavy lands, and.

(*c*) On phosphate manuring, and the conditions under which its practice will prove remunerative.

With regard to green manuring practice it would seem desirable to select a plant that can be sown immediately before—and cut (and ploughed in) at the close of—the wet months of the year ; as, since a crop transpires about 300 lbs. of water for each pound

of dry matter produced, having one in possession of the land during a dry period would affect the trees, perhaps seriously, by further depriving them of moisture. On the other hand the digging in of a crop at the end of a wet season greatly lessens the subsequent loss of water by evaporation from the surface, the mulch formed breaking the continuity of the water film in the soil and thus hindering its ascent by capillarity.

NOTES ON DIOSCOREAS (YAMS).

By F. G. Spring.

These plants are spread over the warmer parts of Asia, Africa and America, each continent possessing particular species, characterized by the shape and colour of the tubers. In Malaya yams are seldom if ever seen, but in the West Indies, particularly, they form a standard diet both for Europeans and natives, the later living largely on this food. Being more nutritious than the potato they constitute one of the most important foods of the tropics. In several countries they take the place of the potato and are considered by many people, who have had an opportunity of tasting them, superior to it. They have been frequently recommended for extended cultivation in India in times of famine as they are not affected by long periods of dry weather. In countries such as Malaya where a large population is almost entirely dependent on the rice crop for their food, yams might, in years of failure of the rice crop, or when the price of rice is such as to almost prohibit its purchase by the average coolie, partly serve as a substitute. Sweet potatoes are often looked upon as yams, but this is not the true use of the word. The true yams are herbaceous climbing perennials with large starchy tuberous edible rootstocks belonging to various species of Dioscorea. These plants may be propagated from aerial or underground tubers. If sets are taken from the latter they should be about the size of an apple or even less according to the variety. Pieces of the tubers are planted for seed the same as with the potato. The upper part of the yam, or that nearest the stem is more suitable for planting than the lower portion.

The yam being a deep rooted plant it is important that the soil be well cultivated to enable the tubers to develop properly. Suitable soils are sandy loams but deep cultivation and good drainage are more important than quality of soil. The land should be forked or changkolled and if possible manured. The soil is then put up in ridges 3 to 4 ft. apart and the seed tubers planted on the ridges at distances of from 1½ to 2½ ft. depending on the variety. The advantage of raising the ground is to ensure better drainage, to do away

to some extent with deep trenching, and to make the condition for lifting the crop more easy. In this country where the climate is more or less uniform throughout the year, planting may be done at any time but the wet season might be taken advantage of. Near each plant is placed a stick for the creepers to grow upon. The stick should be from 12 to 16 feet above ground. A common practice is to plant up trees for support. When this is done pits are dug near the trees; fresh soil and manure being put in after each crop. It is not uncommon to allow the plants to trail on the ground but this method is supposed to decrease the yield slightly. The crop takes from 9 to 11 months to mature. At the end of this time the leaves become brown and drop, the stems die down; this indicates that the crop is ready for lifting. The tubers should be lifted as they are required as they do not keep long when exposed to the atmosphere. When left in the ground they keep for a long period. The yield depends on the variety grown, the suitability of the soil, cultivation, etc., but generally speaking it varies from 4 to 10 tons per acre, approximately the same as the yield of potatoes.

During the past 18 months some 20 varieties of yams were introduced from India, Barbados and Ceylon at the request of the Director of Agriculture, F. M. S. and are being grown at the Kuala Lumpur Experimental Plantation.

The following are the results obtained :—

Variety.	No. of Plants.	Weight of Tubers.
Kirivel-ala	1	¾ lbs.
Katukukul-ala	3	12 ,,
Kukul-ala	3	6 ,,
Java-ala	4	4 ,,
Hingur-ala	2	½ ,,
Kaharta-ala	2	1 ,,
Gugur-ala	2	11 ,,
Wel-ala	2	1 ,,
Kondol	3	14 ,,
Kangsar	4	26 ,,
Tadapdo	6	98 ,,
Kamod	10	126 ,,
Bhusario	6	227 ,,

Lisbon and Oriental yams have also been introduced, besides a number of other varieties.

Although the experiments so far have been on a small scale there is little doubt that the soils and climate of Malaya are ideal for the proper development of the tubers. The weight of individual

tubers compare favourably with those of other countries. The yams obtained from the first years' crop are being used for extending the cultivation at the Government Plantation but it is hoped, at the completion of the second years crop, to distribute a fairly large number of plants to those in Malaya who might care to give them a trial.

The plants were free from insect attacks and fungoid diseases.

It is stated in Vol. III, No. 1, of the Circulars of the Royal Botanic Gardens, Ceylon, that yams may be grown as catch-crops in new clearings of rubber. Up to the present they have not been experimented with here in this line, but there is little doubt that they could only be grown amongst very young rubber as the lifting of the crop necessitates digging the soil to a depth of 2 ft. in some cases, which would seriously interfere with the root system of 2 to 3 year old rubber.

MISCELLANEOUS BOTANICAL NOTES.

By Keith Bancroft.

Cost of Treatment of Pink Disease (*Corticium salmonicolor*). The following is an account of spraying of Para Rubber trees in the treatment for the "pink disease," which was carried out on one estate in this country. The spraying was confined to the forks and branches of the trees, the leaves and small branches being untreated, since the fungus in almost every case arises in a fork of the tree produced by the union of two or more branches. The trees were five or six years of age and exhibited good growth and an abundance of branches. Tamil labour was employed for the work.

The area treated was 33 acres and the number of trees 3162, an average of about 96 per acre. The spraying was applied as a preventive to every tree in the area, the attacked trees having previously been treated by removing the affected branches to one foot below the affected part and burning them.

Bordeaux mixture was applied as the fungicide and it was accordingly necessary to wash the cups, spout and tapping cuts after each tree was treated, in order to prevent the entrance of copper into the latex. The trees were sprayed after the latex had been collected.

The spraying machine employed was a Vermorel Cascade Sprayer with extension rods reaching a height of about 25 feet.

The following account will it is hoped be of interest as giving certain data with respect to spraying on a large scale :—

Field I, 1 and 2, a total of 33 acres were sprayed. As all the trees in these fields were being tapped, spraying could not be

commenced till about 12 noon. Consequently the 5 coolies employed on this work pruned from 6 a.m. till about 12; and then sprayed, receiving 1½ "names." Four men did the actual spraying and wheeling the machine from tree to tree, and one man washed the latex cups and spouts after the trees were sprayed. At first only 3 men were employed, but owing to the heavy weight of the machine when full of mixture and the rough ground over which it was wheeled, the number was increased. A certain amount of the mixture trickled down the bark of the trees where it was being tapped; as far as possible this was wiped off. About 1¼ to 1½ acres were sprayed in one day, an average of about 110 trees, the men finishing their work and returning to the lines about 3.30 p.m. Taking the check roll average at 31.80 cents the 5 coolies cost $2.88½ per day, of which $1.06 represents the cost of spraying. The 33 acres took 24 days to complete and cost $25.44 or the cost of labour to spray one acre was 77 cents. 26 lbs. of Sulphate of copper costing $7.80 was used and also about 40 lbs. of lime costing say $1 50. Therefore the total cost amounted to $34.74 or $1.05 per acre. To this must be added the cost of the sprayer, $150.

The use of Bordeaux mixture on Para trees which are in bearing requires most careful attention in order to prevent the contamination of the latex by copper, salts of copper having a toxic action on prepared rubber. It is for this reason perhaps preferable to employ a lime sulphur mixture. Up to quite recently it has not been possible to use a sulphur mixture owing to the fact that the more powerful spraying machines were made of copper which becomes badly corroded by the sulphur. A galvanised "Fruit Tree Sprayer" is now stocked by the Borneo Company, Ltd., Singapore and fulfils the purpose.

Distribution of the Brown Root Fungus, Hymenochaete noxia. Specimens of diseased roots of Hevea which have been submitted by the Chief Forestry Officer, Entebbe, Uganda, have been found to be attacked by the brown root fungus which is also parasitic on Hevea in this country. And more recently, specimens of the fungus on the roots of young plants of Hevea have been received from New Guinea.

This fungus was first described in Samoa on the bread fruit in 1875, and has since been recorded in West Africa, Ceylon, Malay States, Sumatra, and New Guinea, which embraces a wide area of geographical distribution.

In Ceylon the fungus is reported by Petch as being more abundant than *Fomes semitostus*, the cause of the "common root disease" of Hevea in the Federated Malay States. In this country the reverse is the case, although the fungus is scattered over the Peninsula having been recorded in Perak, Selangor, Negri Sembilan and Johore.

A description of the brown root disease was given in the Agricultural Bulletin F.M.S., and S.S., Vol. X, No. 4, p. 106.

The spread of Fomes semitostus by wash. An examination of a young clearing of Hevea revealed the presence of a number of trees on which the "common root disease," caused by the above fungus, was commencing at the "collar" and spreading thence below ground to the tap root and lateral roots of the trees. A closer examination shewed the mycelium of the fungus growing on bits of wood, bark, &c. which was being transfered by the wash caused during heavy rains from higher to lower parts of the field; and the infection was traced in several cases from the small heaps of debris to the "collars" of the trees, the mycelium developing on the undersides of the bark, wood, &c., which was in contact with the trees at the "collar."

For this area it was recommended that the surface timber should be piled between the rows of trees at right angles to the direction of flow of the wash and that a proper system of contour draining should be adopted.

The disease of Hevea caused by Phyllosticta ramicola. This disease which affects the youngest shoots of Hevea and which was described in the *Agricultural Bulletin*, Vol. I, No. 1, p. 29, has since been found to be widely scattered over the Federated Malay States. It has been recorded in eight separate planting districts distributed over Selangor, Perak and Negri Sembilan. In the most recent record of its presence on one estate seventy trees situated closely together have been affected.

The fungus is closely associated with the die-back (*Diplodia*) and it appears probable that in many cases of the die-back disease the primary cause was this fungus, the *Diplodia* following secondarily.

Disease of Angsana. The fungus which has been observed commonly on the roots and stumps of diseased Angsana trees (described in *Agricultural Bulletin* F. M. S., Vol. I, No. p. 149) has been identified at Kew as *Polystictus hirsutus*. It is, therefore, distinct from the fungus to which the Penang disease was attributed, *viz. Polystictus occidentalis*. *Polystictus hirsutus* is widely distributed over the world occurring on trunks of various trees. There appears to be no record of it as a parasite.

Recently an examination was made of some of the dead Angsana trees in Penang and the symptoms of the disease appear to be identical with those occurring in the Federated Malay States. The fungus *Polystictus hirsutus* was not found on any of the dead trunks.

The above facts would appear to indicate that the trees at certain periods of their lives become susceptible to attacks from wood-destroying fungi. This susceptibility, as was pointed out in the *Agricultural Bulletin*, F. M. S., Vol. I, No. 4, may be brought about

by repeated propagation from cuttings, and it is therefore desirable in the future to propagate the plant from seed. This is being tried at the Kuala Lumpur Experimental Plantation.

Bonduc Seeds or Knicker Seeds. *Caesalpinia Bonduc* is a stout climbing shrub whose stems have a fine grey pubescence and scattered straight small prickles. It occurs in India, Ceylon, Malaya, Polynesia and the West Indies, usually near the seacoast.

The seeds are nearly globular, ¾ inch, smooth and of a grey or greenish-grey colour. The kernels are bitter and are alleged to possess powerful tonic properties. In India they have a reputation for combatting intermittent fevers and as a general tonic.

Recently a case exhibiting symptoms similar to those associated with cholera has been suspected to have been produced by overdosing with a seed which on being submitted to this department for identification proved to be Bonduc Seed.

The seeds are said to be retailed in this country among Tamils. The Tamil name is Punaikkalaichchi.

HOW TO DISTINGUISH DIFFERENT ORDERS OF INSECTS IN THEIR VARIOUS STAGES.

HYMENOPTERA.

By C. B. Holman Hunt.

The next group in the table on p. 39 of this volume is that of Hymenoptera which includes the Ants, Bees, Wasps and Ichneumons, all of which are of great interest to the Agriculturist and Planter.

The abdomen of the female is usually fitted with a sting, piercer or saw and most of the three first groups form large colonies with an elaborate social system. The earlier stages are various in shape, but the larvae are almost always covered with a soft colourless skin, through which the white inner wall is seen, though the larvae of Sawflies are generally green and cylindrical in shape. The pupa has the parts of the perfect insect nearly free from each other and covered with a very delicate integument.

The Hymenoptera are conveniently divided into

1. Terebrantia or Boring Hymenoptera.
2. Aculeata or Stinging Hymenoptera.

The Terebrantia may be further divided into

i. Plant-eating Hymenoptera (*e.g.* Sawflies and Horntails.)
ii. Gall-inhabiting Hymenoptera (*e.g.* Gall-flies.)
iii. Parasitic Hymenoptera (*e.g.* Ichneumon-flies.)

The Aculeata may be further divided into

i. Ants (often stingless and sometimes solitary.)
ii. Digger Wasps (*e.g.* Hornets.)
iii. True Wasps (*e.g.* Social Wasps and Solitary Wasps.)
iv. Bees, which are again divided into
    a. Long-tongued Bees (*e g.* Carpenter Bees and Honey bees.)
    b. Short-tongued Bees (*e.g.* Mining Bees.)

To take these subdivisions in order :—

The Plant-eating Hymenoptera are known also as the Sessiliventres, as they have the abdomen broad at the base and connected with the thorax throughout and not merely by a narrow stalk. The boring instruments of the female may be either concealed or exserted.

The larvae have usually three pairs of well formed thoracic legs in the case of the leaf feeders, and several pairs of abdominal, or prolegs, which are destitute of hooks (compare these with the strongly hooked claspers of a moth or butterfly caterpillar.)

The larvae always feed on vegetable matter, usually on the leaves, sometimes in galls in the stem and again sometimes in the wood itself.

The Sawflies are an important family of insects and very destructive to vegetables and fruit, but they are usually of small size and but little known to the public.

The saws are usually paired and often not merely toothed along the edge, but with roughness on the side which enables them to act as files. The eggs are laid in the slits made by the saws in the leaves or stem. The eggs grows in size after being laid! The resultant larvae differ much in shape, being sometimes flat and slimy like a small slug, but they are usually cylindrical. They then can be recognised generally by the end of the body, which is curled round for the last three or four segments.

Sawflies are very rarely social in habits but there are often a number of larvae to be found feeding on the same leaf.

The offspring of a single female may amount to 27,000,000 (twenty seven millions) in one year! but they are fortunately liable to fungus and nematode pests, which kill off large numbers.

At this point it may be interesting to note that among the Hymenoptera the phenomenon of Parthenogenesis (where the female breeds without fertilisation) is prevalent. Usually the parthenogenetically produced eggs give rise to a large proportion of males; whether this is due to constitutional weakness owing to insufficient nutrition (for a well fed larva usually gives rise to a female adult) is not quite certain.

Although as a rule insects do not display any interest in their young after they are hatched, however solicitous they may be in

providing a suitable laying place for their eggs, one of the Australian Sawflies remains with the larvae after they are hatched and guards them against the attacks of parasites.

The Horntails (as the name suggests) may be recognised by the extremity of the body being provided in the female with a long, cylindrical boring instrument. The larvae feed in wood. These insects are often of large size and conspicuously coloured. The boring instrument does not usually arise from the end of the abdomen but from the lowest part of some segments nearer the thorax, it consists of a slender stiff tube enclosed in a pair of elongated sheaths. The tube itself consists of two side pieces and a third covering piece above. The abdomen has a short stout spike at the end which enables the insect to bore into hard wood in which the eggs are laid.

The Sirex or Horntail will not usually lay its eggs in perfectly healthy growing trees but does not hesitate to do so if the tree is weak or has been felled. The larvae causes much damage to deal and often reduces the value of such timber considerably.

The larva spends its life in the tree, forming tortuous galleries, which it increases in size as it grows. It turns into a pupa and may often exist for some time in that state. When the perfect insect emerges, it cuts its way through the wood to the open air and does not emerge through the gallery already made. The Sirex has been known not merely to cut its way through wood but also through lead, when the wood in which it is living is encased in that metal.

Horntails often emerge from furniture made of the attacked wood.

Gall-inhabiting Hymenoptera. These have been in some systems of classification been placed at the beginning of the Hymenoptera Petiolata, which are characterised by the abdomen being attached to the thorax by a narrow stalk. This enables the abdomen to be twisted about more freely when it is used for stinging or boring. In some Petiolata the stalk is very long.

The Gall-flies are the cause of galls on Oak leaves and the Bedeguar of the Rose tree. The insects lay their eggs in a leaf and little or no swelling is noticed until the larva hatches out inside. Then the movements and perhaps excretions of the insect cause the cells of the plant to increase in number and size, and the larva feeds on the food provided by the growing material of the plant. All our readers have probably noticed the Oak galls, but the Bedeguar of the Rose may have been overlooked. The stem of the rose appears to be greatly swollen and covered with long hairs generally crimson in colour.

The mode of procedure is that the Gall-fly pierces the base of a leaf bud and lays several eggs in it. These hatch out and cause

the swelling which not only affects the leaf-bud itself but also the adjacent tissue and makes it form an abnormal brightly coloured excrescence.

Closely allied to these insects are those which cause cultivated Smyrna figs to assume the large size and shape that we know so well. The males of the Fig-insects are generally wingless, but the females have fully developed organs of flight.

The process is known as Caprification and has been long since known to those who cultivate Fig trees. Cultivated Fig trees were found not to set fruit properly unless fruit-bearing branches of wild figs were hung up in the neighbourhood.

The young fig is normally a small, hollow, fleshy receptacle lined with small flowers. A small hole at the blunt end of the fig is the only means of admission and this orifice is filled with projecting scales. The males are, as before mentioned, wingless and do not leave the fruit in which they were bred, but the females emerge from the wild fig and try to enter the cultivated fig to lay their eggs. Many divergent views are held as to the actual value of caprification, but the development of the fruit tissue is probably due to the irritation of the part attacked by the Fig-insect in its attempt to enter the fruit. Caprification is said to be successfully imitated by thrusting a well oiled needle into the cultivated fig, which tends to prove that the process is mechanical. It is curious to note that the Fig-insect cannot live exclusively on the cultivated fruit.

The next article will deal with the Ichneumons, one of the most valuable Insect aids of the Planter and Agriculturist.

NOTES ON MANURING.

By R. W. Munro.

Touching upon the question of manuring generally, and looking at it mainly from a Tropical Planter's point of view (because otherwise I should not consider myself competent to look at the question at all) I think that the chief points to be taken into consideration are:—

1. *Nature of the soil under cultivation.*
2. *The natural requirements of the tree itself.*

Assuming that our product is being grown under ordinary climatic conditions, and that our soil is not obviously deficient in the recognised fertilizing ingredients, there will almost always be a certain amount of material available and to be taken advantage of to avoid unnecessary expenditure on artificial manure, at any rate for a good many years after the trees have commenced to yield their first crop.

The usually accepted constituents of plant food *viz: Nitrates, Potash, Phosphates* and *Lime* can be made available on a very large proportion of the soils in this country but, as a matter of fact they very seldom are; from personal observation it seems to be a most essential thing to try and give humus to soils which are regarded as deficient in this respect, and I doubt whether green manures have been sufficiently tried with a view to supplying a remedy.

It seems to me impossible to discuss the question of manuring either natural or artificial apart from that of the generally accepted form of cultivation, or aeration of the soil, and most of us when we touch on the subject of manuring are apt to lose sight of the benefits derived from keeping the soil in a friable state by mechanical means or otherwise. Constituent parts of any soil can no doubt be determined by analysis, but exactly how to make these available as food for the plant is another question: on stiff soils it is often considered that Lime is the best fertilizer in the world not only on account of its disintegrating qualities, but for correcting sourness, and acidity.

The notion has become very prevalent of late that it is necessary to resort to artificial manuring in order to develop the growth of the trees, and increase the yield therefrom, and this method is often resorted to before it has become an accepted fact that the plants, or trees have failed to respond to any other kind of treatment.

On fields of closely planted rubber of an age when the question of manures would be likely to come under discussion it would be found difficult on account of the heavy shade satisfactorily to establish green cover crops as manure, whereas with some other products planted more widely the same difficulty would not arise; so that we now come to another, and almost as wide if not wider question, *viz:* that of planting distance on which discussion may fairly be considered as endless, although taken in conjunction with the question of manuring it is bound to play a very prominent part. It is an acknowledged and significant fact that green manures sown on poor or used up soils are slow to establish themselves, but once established should be I think the means of improving the physical conditions of the soil more effectually and economically than by the application of artificial stimulus, which may be found necessary to apply at more frequent intervals, at higher cost.

Most of the green manures collect nitrogen from the atmosphere and place it in an available form in the soil. The health of the tree or plant is generally shown by its leaf surface, and it should naturally follow that the greater the transpiration through the leaves the stronger the tree or plant should be made capable of yielding.

It is not only, of course, nitrogenous green manures that are available; for instance I have just received through a friend some

seed of a well known cover plant of which it is stated 1000 lbs. green cuttings equals 400 lbs. castor cake.
10 „ bone meal.
10 „ Sulph: potash.

The important principle of cultivation would seen to be protection of the feeding roots of the trees, and the prevention of a check to their growth and welfare in the time of drought, so that land on which a system of tilling and mulching is practised should under ordinary conditions be capable of holding its own against anything artificial for some years after the first crop has been taken off it.

MALAY KAMPONGS IN THE DISTRICT OF TEMELOH, PAHANG.

By L. C. Brown.

During the middle part of September 1912, I inspected the Coconut plantations in the District of Temerloh, Pahang, in my house boat. The start was made from Kuala Krau and I visited the following mukims :—Kuala Tekai, Kuala Krau, Lepat Kajang, Kerdau Sanggang, Bangan, Lobor Trua, Song Sang, Tenggoh, Temerloh, Lebor, Mengkarak, Triang, Kuala Bera, Tebing Tinggi, Kertow, Sentang and Chenor. The plantations lie on either side of the river and the largest mukims are Chenor, Kertow, Sentang Tenggoh, Temerloh and Sanggang. The coconuts themselves are now bearing very well but the fruit is not very large and this may probably be accounted for, either from old age or want of proper cultivation in the past.

I was very pleased to find generally an immense improvement in the cultivation of the Coconuts, the natives are decidedly taking a greater interest in their holdings and many of them are now interplanting young plants where the trees are becoming old. These plantations all belong to the Malays and are usually described as Malay kampongs. In many mukims they are contiguous one with another, each owner fencing his land all round the boundaries. The fencing is generally made of posts cut from the jungle with lighter wood for the railings, bamboo and barbed wire being also used for this purpose. As these posts have frequently to be repaired and are often broken through by buffaloes I have suggested the planting of the Betelnut palm at distance of 3 to 6 feet apart which in 2 or 3 years time will be of sufficient girth to allow of barbed wire alone being used for the railings and this would mean a lasting and strong fence requiring little or no repair. Many Malays are now adopting this system and appear to appreciate its value. The

Kampongs are planted up with Coconuts, Betelnut, Fruit trees, Sirih or Pepper vine, sugar cane and vegetables of different kinds, and in addition to this many of the owners have padi land in the interior which necessitates them keeping buffaloes for ploughing and tilling in the preparation of the land before the padi is sown.

Now that the natives have been induced in their own interests to give more attention in the cultivation of the coconuts, many of the holdings are quite clean and very well maintained. The grass, kept down by the grazing of sheep and buffaloes, is generally short and of a soft bright green colour which tends to give a very pleasant appearance to the plantation. It would be really difficult to imagine anything more ideal for Malays than these native holdings, which with the adjacent padi land appear to yield all they can possibly want that is needful for their welfare. The Kampongs are exceptionally well situated and are about 25 or 30 feet above the banks of the Pahang River, on both sides of it. There is always a convenient and large attap building on the premises for the owner and his family and what with coconuts, fruit trees, padi land, etc., the products from which alone should prove ample for the support of himself and his family, grazing ground for the buffaloes and sheep, breeding of fowls, I am inclined to quote from one of my Annual Reports, that I am of opinion, a native, with comparatively small means who owns his 5 or 10 acres of land on his Kampong property kept and cultivated is in his own way as well and comfortably off as the more wealthy owners of larger estates. I am quite in favour of, and always encourage, the planting of fruit trees and other productive catch crops between the coconut trees, provided the holdings are kept in good order, as they assist in returns while there is less vacant space to keep clean, a condition which suits the Malay. While on this question I think the Malay would be far better off if he were encouraged to retain the old form of cultivation in his Kampong instead of going in for Para Rubber as many of them are now doing. Unless rubber and coconuts are planted quite separately they can never be grown with any advantage at all. Again I may mention that Para is by no means a good or suitable "Kampong tree," as owing to its excessive shade, and its numerous and extensive lateral roots, fruit trees and other productive plants as previously mentioned, which prove so valuable an addition for the support of the native family, will not thrive underneath it and as soon as the Para tree reaches maturity it either ousts the coconut tree or prevents its producing fruit so the owner of this land at this period has very little to fall back upon.

In concluding this article I would mention that I am much indebted to Mr. Hemmant, the District Officer, for the assistance he rendered me during my trip and who was good enough to accom-

pany me in one of my rounds of inspection at the time of my visiting the mukim of Temeloh. I feel sure that the present satisfactory condition of the native holdings in his District is due in no small way to his influence with the Malays who hold him in such great respect and in whose welfare he takes so keen an interest.

THE WATER-HYACINTH.

By Keith Bancroft.

The water-hyacinth (*Eichornia crassipes*) is said to have been originally native of Brazil. The beauty of its flowers and the ease with which it can be propagated have led to its introduction to tropical and subtropical regions, among others to Australia, Florida, India, Ceylon, Federated Malay States and the West Indies.

The plant possesses a tuft of leaves which are provided with a swollen base by means of which it is able to float on the surface of the water. It inhabits ponds, canals, slowly moving streams and rivers. It is propagated mainly by means of offsets which arise from the base of the parent plant, each giving rise to a new plant. Detached portions are also blown from place to place. By this means it spreads with great rapidity, choking up rivers and water-courses so as to render traffic impossible. It is recorded that the plant has arrested steamer traffic in Australia. I recollect in the West Indies that the plant had accumulated a growth on the surface of a pond so dense that it was possible for anyone to walk across without being submerged to a depth of more than a couple of inches.

The flowers of the plant are arranged loosely on a central stalk and are pale violet, The upper lobe of the flower is larger than the others and has a patch of blue with an oblong or pear-shaped spot of bright yellow in the middle. They are very beautiful, but are of somewhat short duration, lasting only for one day.

The plant is popular among Chinese in the Malayan Peninsula by whom it is grown for ornament. Ridley relates that he has seen the flowers hawked in the streets in Singapore for sale. It is also said to be grown by Chinese for feeding pigs.

The rapid growth of the plant has rendered it a nuisance in several parts of the tropics and considerable quantities of money have been spent in getting rid of it. The most satisfactory means of eradicating it is to remove it from the water, allow it to dry and then burn it.

THE LAYING OUT OF A GARDEN.

J. LAMBOURNE.

The laying out of a garden is often more difficult than its after management, as considerable study, taste, and judgment are required to make it really effective. It is well to remember that however much the success of a garden may depend on its original design, the work of laying out the space available to the best advantage may be said to be a progressive one, as there are many and varying oportunities of effecting changes and carrying out new ideas. It is in these many opportunities that much of the charm of gardening lies.

Although many alterations may be carried out afterwards it is well to have some definite ideas before the work is commenced. A rough sketch of the grounds should be made and the work guided thereby. It should be remembered that no hard and fast rules can be given for application in all cases as there are so many things which differ in different localities such as lie of the land, water supply, surroundings and also the labour available.

A favourable position for laying out a garden is always desirable, yet much can be done, with properly directed effort and due expenditure of money, in over-coming obstacles and physical disadvantages. A most unsuitable site may thus be converted into a pleasant garden. One of the first considerations should be, how to convert the available land into a pleasurable resort with the least possible expenditure of time and labour. Ugly objects may often be more easily beautified than removed and what appears most serious obstacles may sometimes be transformed into beautiful ornaments.

One of the greatest mistakes often made in commencing a garden is the cutting out of all existing vegetation. This although it may be jungle, may not only have some ornamental features, but will furnish useful shade until trees of a more ornamental character have grown up to take its place. There are many advantages in obtaining a good effect in a short space of time. This can often be done where virgin jungle exists, by isolating trees in clumps, or by separating shapely ones to form isolated specimens, and levelling and turfing, or planting with grass the ground between. The details of laying out can be attended to later, and as choicer plants are introduced the undesirable ones may be cut out. There are many trees and shrubs growing in the jungle of this country which, if isolated soon enough, would make very handsome specimens and would hold their own for beauty with the choicest that could be introduced.

Let me hasten to explain that the above applies more especially to large gardens. In very small gardens large trees should be

avoided as they look altogether out of proportion, and also take up space which may be used for something more ornamental. When large trees are crowded into a small garden they tend to make the garden look smaller than it really is, and in addition they exclude light and air from the house and smaller plants beneath.

A good water supply is an essential provision for every garden; the source of supply should therefore be placed where it can be most easily carried to all parts of the garden. If a well is dug it should be hidden from view by having shrubs planted around it.

In laying out large or medium sized gardens straight lines should be avoided as far as possible and any attempt at formality should be guarded against. In small gardens however formal designs are often more appropriate.

Before planting is done, the ground should be trenched and drained, the soil being turned over to a depth of 15 to 18 inches, and all roots and large stones removed. It will be necessary to do a certain amount of levelling as a fairly uniform surface is required, especially in the case of lawns. If the lawns are intended for Croquet or Tennis the surface should be made as level as it is possible to get itand the surface soil made very fine. The nutritive condition and texture of the soil should be improved if necessary by the addition of suitable manurial material. If the land is steep it may be terraced, this lends itself to very pleasing effects if the terraces are carefully laid out and planted.

Paths are essential to a garden for convenience; they may however be made to contribute to the general effect. They should only be made where actually necessary; and where curves are necessary these should be made as graceful as possible. The width of the paths should depend on the importance of their position, a breadth of about five feet is a good average for a small garden. The principal walks should be wide enough for at least two persons to walk abreast in comfort, in more extensive gardens they may be considerably wider. In making paths a good foundation and drainage are essential. The surface soil should first be removed and a layer of drainage material (stones, brick, etc.) should be placed at the bottom. This should be covered with a layer of coarse binding gravel which should be stamped and rolled throughly, being well watered in the meantime; the surface should be finished with a layer of fine gravel, firmly rolled and beaten down. It is often advisable in countries like ours, where heavy rains are experienced, to make small parallel side drains on either side of the paths, below the level of the latter, leaving a strip of turf about a foot wide between the drain and the path; small sloping channels should at intervals lead into the side drains so as to facilitate the escape of surface water during heavy rains. Paths should not be of too steep a gradient or they will be

liable to be washed away by heavy rains. This can be obviated on steep slopes by introducing graceful curves, or easy flights of steps. The paths should be kept clean and free from weeds and hollows, and the edges of the grass should be cut even and straight. It should be remembered that weedy paths and crooked edges give an unfavourable appearance to the surroundings, however well they may be kept.

When arranging and planting, great care should be taken not to crowd the garden with tall trees. These should be placed in the background with smaller trees and shrubs to the front, and arranged so as not to obstruct the view of any pleasing landscape or distant scenery. In planting, avoid straight lines as far as possible.

One of the features of a well proportioned garden should be an open expanse of lawn which should not be sacrificed by the inclusion of too many single plants or beds. A few beds of bright ornamental flowering or foliage shrubs carefully placed should where possible be introduced. These when carefully selected are always a feature in a well arranged garden and have the advantage of lasting a considerable time without requiring to be renewed. Another very important point in arrangement is the blending of colours. Care should be taken in selecting positions for plants that they are not in combination with, or close to those with whose colours they will clash.

A knowledge of the plants at one's disposal is also necessary, as plants that will do in one possition will not do in another. Some require full sun for a successful growth, while others require shade, or partial shade. By placing these plants under suitable condition their beauty may be shown to the best advantage.

Plants which are known not to succeed in certain localities should not be planted unless special provisions are made to make them a success, such as position, soil, etc. They should on no account be given permanent positions until it has been proved that they will succeed under these conditions.

Such positions as along the edge of a jungle, by a wall or fence, or by the side of a carriage drive are well suited for borders of mixed flowering and foliage shrubs. The border should not be too wide; this will depend however on the length and space available in front. Care should be taken to place the tall growing plants at the back, and the dwarf ones in front, forming a bank of foliage and flowers every plant of which can be seen from the front. In the case of a border where both sides are visible the taller growing plants should be placed in the centre. Irregular clumps of shrubs at the curves of paths or carriage drives often have a very pleasing effect.

As a rule flowering or foliage plants look best when massed together in simple designs, such as circles, ovals or squares. A

circular bed planted with a mass of plants, the flowers and foliage of which are of harmonious colours, is always a pleasing sight. Beds of elaborate design with many curves and angles should be avoided. They involve more labour than a simple design and it is often difficult to find plants to fit into the nooks and corners. It should be remembered that the beauty of a garden does not depend on fantastic shapes and serpentine curves. In order that the beds may be kept in proper condition they should not be crowded too closely together, but room should be allowed for persons to walk about among them so as to view them with comfort.

In a climate like ours so favourable for plant growth it is surprising how few really effective and well arranged gardens one sees. This may of course be due to lack of interest in horticulture which is unfortunate in the sight of all true lovers of plants and flowers, or it may be due to placing too much reliance on the native gardener whose knowledge extends to cutting grass on lawns, but whose ideas of gardening are very rudimentary.

The above article must only be taken as a general outline of the subject; but it is hoped that it may be of some use to garden-lovers who intend laying out new gardens or renovating old ones.

ABSTRACT OF MINUTES OF MEETING OF THE PLANTERS' ASSOCIATION OF MALAYA.

Held at the Chamber of Commerce, Kuala Lumpur, on November, 17th, 1912 at 11.15 a.m.

PRESENT.

Mr. E. Macfadyen (in the chair).

Mr. H. C. E. Zacharias (Secretary), Mr. G. H. Day (Legal Adviser) and the following delegates:—

Mr. C. Burn-Murdoch	from Kajang	D. P. A.
„ E. N. T. Cummins	„ „	„
„ H. J. Cooper	„ Lower Perak	„
„ R. W. Munro	„ Kuala Langat	„
„ F. J. Dupuis	„ „	„
„ W. Towgood	„ Kuala Selangor	„
„ R. W. Fox-Male	„ Malacca. P. A.	
„ G. W. Gutteridge	„ „ „	
„ E. P. Howard	„ Kapar	D. P. A.
„ E. H. King-Harman	„ „	„
„ J. G. Cruikshank	„ „	„
„ G. A. Craib	„ Klang	„
„ A. J. Fox	„ Kuala Lumpur	„
„ G. W. Templer	„ Negri Sembilan	P. A.

also the following visitors: Messrs. L. Moojaart, E. Carr, B. Majendie, R. Thomson, A. B. Carey, C. W. Brodie, E. Templar and J. W. Ferguson.

The Minutes of the Meeting held on August 25th are on the motion of Mr. Towgood, seconded by Mr. Munro, taken as read and confirmed.

New York Exposition.

The Secretary reads two letters from Mr. C. E. S. Baxendale.

The Secretary also lays on table Mr. C. E. S. Baxendale's paper on "The Plantation Industry" and his report on the Exposition.

Mr. Macfadyen eulogizes the excellent work done by Mr. L. Wray in connection with the Exposition and the exceedingly able representation of the Association by Mr. C. E. S. Baxendale, and proposes a hearty vote of thanks to both gentlemen.

Mr. Munro seconds the motion, which is carried with applause.

Mr. Macfadyen, before passing on to the next business on the agenda, would make again an appeal for subscriptions from estates and planting companies for the expenses incurred in connection with the Malayan Exhibit. He would point out once more that on this occasion the Government instead of stipulating for a certain proportion as on other occasions, had guaranteed the whole expense, simply relying on their sportmanship to make a contribution. If they relied in vain the Association might not find them equally reliant on a future occasion.

A circular letter was being drafted and would be sent to all members of constituent associations with a request to forward same to their Directors.

Education on Estates.

The Sub-Committee's report was read and it was decided that this should be printed separately and circularized amongst all members of constituent Associations.

Telephones at Railway Stations.

The following motion was carried: "That the Chief Secretary be asked to receive a depuation consisting of Messrs. Macfadyen, Cummins and Fox to discuss the possibility of installing telephones at Railway Stations."

Repression of Drunkenness.

Mr. Macfadyen reports that petitions had been received, asking for permission to sell Samsu to Tamils. Members would know that these proposals had been discussed at a recent meeting of the Federal Council and that he had spoken strongly against any relaxa-

tion of the present rules. The agitation was clearly one got up by interested parties and he thinks it would be fatal to open any new loopholes. He therefore would propose: "That this Association strongly deprecates any modification of the present licensing rules permitting public house licensees to retail Samsu to Tamils." He would also impress on all planters the necessity of seeing to the strict enforcement of the Rules and of heartily cooperating with the Government in this respect, even at the cost of personal trouble and inconvenience.

Mr. Burn-Murdoch seconds the motion and points out how well the present regulations were working and instances the last Theebavali festival.

Mr. Fox endorses these remarks and is gratified that this year there had been no drunkenness nor brawls, as used to be the invariable rule in previous years at Theebavali.

Mr. Templer reports a similar state of affairs in Negri Sembilan.

Mr. King Harman says that in the whole of Kapar this year there had been only three cases of drunkenness, one of which had led to the conviction of the shopkeeper responsible.

Mr. Munro intimates that in his district a conviction had recently been obtained and an exemplary fine of $200 imposed.

Mr. Towgood points out that some of the cheaper beers contained gin and that this matter deserved to be watched.

The motion is carried unanimously.

Honorary Members.

The Director of Agriculture and Controller of Labour are elected as Honorary Members.

Mr. Macfadyen gives notice that he will propose at the next Meeting that Mr. Leonard Wray be made an Honorary Member of the Association.

Letters were read from Messrs. T. H. Hill, H. N. Ridley, John Turner, E. V. Carey, C. Meikle, John Gibson and R. M. Harrison expressing their appreciations at being elected Honorary Members.

Railway Ambulance Coach.

It was decided that the telephone deputation be instructed to urge the matter of the necessity for an Ambulance Coach on the Railway at their interview with the Chief Secretary.

RIDLEY FUND.

The Secretary reads the following correspondence:—

Kuala Lumpur,
3rd September, 1912.

H. N. Ridley Esq , C.M.G.

Dear Sir,

I have much pleasure in handing you herewith draft, value five hundred guineas, which amount has been collected from the various planting interests in the Peninsula.

I am directed to forward this draft to you with a request to select yourself a piece of plate, which the donors trust you will kindly accept as a slight token of the grateful esteem your work will ever be held in by all those connected with the rubber industry in this Peninsula.

Believe me, &c.
(Sgd) H. C. E. Zacharias.
Secretary.

September 28th, 1912.

Dear Sir,

I shall be very glad if you will convey to the subscribers of the money, received by draft from you this morning, my deepest and heartiest thanks for their great kindness in their acknowledging my work in furthering the rubber planting industry in the Malay Peninsula.

It is most kind of them to remember me in this way and whenever I use the plate which I shall purchase with it, I shall always remember with pleasure the good old friends that I have among the planters of the Malay Peninsula and the many kindnesses I have received from them.

I wish them all the greatest possible prosperity in their future work.

Believe me, &c.
(Sgd.) Henry N. Ridley.

H. N. Ridley Esq., C. M. G.

Dear Sir,

Reverting to my letter of the 3rd ult., I find, after sending you the draft of £525, that I still have a balance of about £20 in hand, which it is suggested to devote to the purchase of an enlarged photo of yourself, the said picture to be suitably framed and hung up in the offices of the Association.

I trust this will meet with your approval and shall be glad, if you will be good enough to allow your photo to be taken accordingly.

Believe me, &c.,
(Sgd.) H. C. E. Zacharias,
Secretary.

JAVANESE LABOUR.

The Secretary reads the following :—

Singapore, 2nd October, 1912.

Consulaat-Generaal der Nederlanden.

Sir,

With reference to the interview which Mr. H. J. Cooper and Mr. M. Maude as members of a Subcommittee of your association had with the Governor-General of Netherlands India early this year and to the letter dated Ratanui Estate, 2nd February, 1912, and presented to His Excellency on that occasion, I am requested to inform your Committee that the law obtaining in Netherlands India does not preclude employers of Javanese labour in the Malay Peninsula from taking the recruiting of natives of Java into their own hands and, accordingly, from establishing their own Recruiting Agency in Batavia or elsewhere in Java provided they conform to the provisions of the Recruiting Ordinance (Staatsblad 1909, No. 213).

It should however be clearly understood that such recruiting of natives of Java for labour outside Netherlands India can be done on behalf of such employers only as have received a special permit for this purpose and that if at any time a license for the establishment of a Recruiting Agency be granted, in accordance with the provisions of Section I of the above Ordinance, it does not follow that applications for such permit will in such instance be favourably considered.

In conclusion I am to inform you that no definite statement can be made for the present with regard to any possible revision of the existing recruiting law in the sense of paragraph 7 of the above quoted letter.

I have, &c,
(Sgd.) H. Spakler,
Consul-General for the Netherlands.

Kuala Lumpur, 4th October, 1912.

The Consul General for the Netherlands,
Singapore.

Sir,

I have the honour to acknowledge receipt of your letter 2407 of the 2nd instant, and to thank you for the information contained therein, which I will in due course place before the members of my Association.

I have, &c.,
(Sgd.) H. C. E. Zacharias,
Secretary.

Kuala Lumpur, 5th October, 1912.

H. J. Cooper Esq.,

Dear Sir,

Please find enclosed for your information copy of letter just received by me from the Dutch-Consul-General at Singapore.

Believe me, &c.,
(Sgd.) H. C. E. Zacharias,
Secretary.

Telok Anson,
Perak.
15th November, 1912.

The Secretary,
The Planters' Association of Malaya,

Dear Sir,

With reference to your letter of the 5th October enclosing a reply from the Government of the Netherlands Indies to the representations made to them by Mr. Maude and myself in March last, I have made every effort to obtain something more definite than is given in this reply, but without much success.

I saw the Vice-Consul in Singapore on October 11th, but he was only able to tell me that we should have to make a formal application for a license for a Recruiting Agency, and that this would be submitted to the Government in the usual way.

I then sent to Batavia for a copy of Recruiting Ordinance referred to in the letter and now attach this together with a translation of the first part.* The rest of the Ordinance details the arrangements that must be made for the carrying on of recruiting. It is now for the P. A. M. to decide whether they will make this application, and establish an Agency for the Malay States, or simplify the procedure by the appointment of one of the present authorized Recruiting Agencies in Java as our Agents. This would do away with the many difficulties to be faced in the establishment of a new Agency, which would be competition with, and therefore opposed by, the present licensed Recruiters.

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*ARTICLE I.

1. The recruiting of Natives from Java and Madoera-Island for the purpose of being employed by commercial industrial and or agricultural concerns is not allowed, unless sanctioned by the Authorities.

2. Such sanction be essential for both Recruiting-Agent or Manager of any Recruiting-Office and anybody employed by him or them, directly or indirectly.

3. Such sanction be afforded in writing (and to remain in force until cancelled) by,

A. The Head of the District to any Recruiting-Agent(s),

B. The Head of the Division to Assistant-Recruiting agents.

We could arrange with this Agent for a fixed commission per coolie, and if there was a general agreement to go the one agency, no doubt the terms would be lower than at present charged. This Agent could also obtain licenses for our Mandors to recruit in Java for him, and by thus employing our own men we should be in a position to secure the class of coolie we want, and to reduce the large sums paid at present to sub-agents, who are simply professional recruiters with the sole object of obtaining as much for themselves as possible.

As we explained in our earlier report the Agents in Batavia and elsewhere do not do any actual recruiting themselves, merely attending to the enrolment of the coolies brought to them, and they are in the hands of their own half-caste Sub-Agents, who make terms with the village headmen. Until we can replace these sub-agents by men working in our interests we cannot hope for much reduction in cost, and this can only be done by having our own mandors licensed, and working for our agent.

I do not think our work so far has been without result as the price per head of coolies which was steadily rising has fallen by some $10 since our last visit to Java, and if the P. A. M. will now agree to continue the work on the lines I have suggested, I am confident we can go further, in spite of the many difficulties put in our way by those having vested interests.

Yours faithfully,
(Sgd.) H. J. Cooper.

Mr. H. J. Cooper suggests that the matter be referred to the Standing Committee and brought up again at the next meeting of the Association, as members had perhaps not had sufficient time to consider the question.

Agreed to.

Telugu Recruiting:

Mr. Macfadyen wishes to draw the attention of members to the vast possibilities of recruiting Telugus. He reminds them that the total number of Telugu Coolies recruited from Cocanada last year was 8,000—exactly the same numbe as that of Tamils that came over in 1905 from Nagapatam. They all knew how the latter recruiting had expanded and he knew of no reason why recruiting in the Telugu Districts should not develop similarly.

The Immigration Committee were going to establish Depot-Camps either at Cocanada or Vizagapatnam and were trying to arrange for convenient sailings. The possibilities were every great and he hoped planters in this country would be full alive to them and take full advantage of them.

Mr. King-Harman prefers Cocanada to Vizagapatnam and describes recruiting done in these districts especially for Assam and exposes the unscrupulous methods of some recruiters.

ESTATE DRESSERS.

The Secretary reads the following letter:—

Office of Principal Medical Officer,
F. M. S.
22nd October, 1912.

No. 7 in 705/1912.

Scheme for Dressers to be trained by Government for employment on Estates.

Sir,

I have the honour to inform you that I am instructed to ascertain from your Association their views on the proposed dressers scheme as per enclosure herewith.

I have, &c,
(Sgd.) Charles Lane Sansom.
Principle Medical Officer, F.M.S.

The Secretary,
The Planters Association of Malaya.

SCHEME I.

PROBATIONER DRESSERS.

Sixty youths could be trained at certain Government Hospitals in the F. M. S. for one year.

These lads could be selected either by me or by Managers of Estates; in the latter case a certificate must be produced showing that the lad is sufficiently well educated to benefit by the special instruction and also of good character.

I suggest that the Manager of an Estate on behalf of his Company should make an agreement with the probationer to pay for his upkeep during his training, and to engage him after passing his examination for such period as may be agreed upon at rates of pay 10% above those allowed under the Dressers Scheme.

The Manager will deposit $400 with the Government for each probationer received for training, $30 per month will then be paid to the Probationer for his upkeep and the balance will be given to the hospital staff when a probationer passes a satisfactory examination at the end of his term of training, such bonus to be divided as follows:—50% to the Medical Officer in charge, Assistant Surgeon or Dresser in charge of wards 25%, and Dispenser 25%. In the event of failure to pass the examination such bonus will be returned to the Manager.

It should be suggested that the probationer's relatives or friends might be asked to provide some sort of guarantee to encourage the pupil to be diligent and behave himself, otherwise there will be a little control over him. It must be clearly explained that one year's training will only suffice to make a probationer dresser sufficiently expert to go round the lines, find out who are sick, administer simple remedies and attend minor ailments and injuries. Such probationer dressers would not be fit to undertake charge of an Estate Hospital except under constant supervision.

There are no Government quarters available for this number of dressers—possibly a few could reside in their own homes, provided such homes are sufficiently near the hospital —a few (possibly 10 or 12) could be received into the quarters now occupied by unmarried dressers.

SCHEME II.

Hospital Assistants.

As the Medical School can receive a certain number of pupils for training as Hospital Assistants, I strongly recommend that this should be brought to the notice of the Planters' Association. The Medical School turns out reliable capable men and although the course is 2 years and the expense of training greater, yet the corresponding advantages of obtaining such men more than counter balance the extra cost.

I think the high Educational Standard Government wisely insists upon for their own staff might be somewhat relaxed in the case of Estates, for instance, lads who have very nearly passed the 7th Standard and are reported to be of good character could be selected for this service.

Mr. Macfadyen strongly commends the Scheme and invites members to agree to it.

There was another matter he wished to speak about in this connection, *viz :* that the quarantine of seven days which all coolies had to undergo at Port Swettenham, be utilized for the treatment of Ankylostomiasis. He would be glad if this matter was considered by all members in consultation with their own medical officers, so that the matter could be usefully discussed and definitely dealt with at their next meeting.

With a vote of thanks to Mr. Macfadyen for his work on the Federal Council the Meeting terminates at 1. p.m.

(Sgd.) H. C. E. Zacharias,
Secretary.

REPORT ON THE NEW YORK INTERNATIONAL RUBBER EXPOSITION, 1912.

By C. Baxendale.

Representative of the Planters' Association of Malaya.

Owing to the extraordinary development in the manufacturing business (both in the United States and Canada) and the keen desire of Americans to learn more about plantation rubber, I am of opinion that this exhibition will prove of greater value to our community than either of its predecessors, considerable as their value no doubt was.

The Brazilian Government, which is naturally anxious to maintain its country's position as the leader of rubber production, is said to have spent £12,000 on its section, but thanks to the picturesque and instructive arrangement of the Malayan Court by Mr. Leonard Wray, the latter proved to be the most attractive at the Exhibition.

We were visited by representatives of nearly all, if not all, the rubber-using factories of the American continent, who amongst them consume considerably more than half the rubber produced in the whole world, and it is obvious that their views of Plantation rubber are of first importance to our industry.

As plantation rubber shows a gain of from 20% to 25% compared with fine hard Para at similar prices, the American manufacturers have shown their appreciation of the fact by increasing their imports of Plantation from 6,590 tons in 1911, to 8,067 for the first 8 months of 1912.

The causes which have led to the loss of premium on Plantation rubber are lack of uniformity in tensile strength and bad packing, which results in chips of wood getting into the rubber thereby increasing the work at the factory. As I propose to show later on, the planter is not necessarily to blame for the former offence, and is certainly not responsible for the latter, but, unfortunately, he has to bear the full penalty for both.

I received cordial invitations to visit most of the important factories, and although time allowed me to avail myself of no more than a small percentage of these opportunities, I collected much valuable information as to manufacturers' requirements.

No one could fail to be impressed by the rapid strides the industry is making in the United States and Canada. Protected by an import duty of 50% on manufactured goods in the States and 25% in the Dominion, the factories can afford to pay far higher wages than prevail in the Old World and are still in a position to export a large proportion of their output. I now propose to give a

selection from the views expressed to me by manufacturers and others, which bear, directly or indirectly, upon the future of plantation rubber.

The United States Government.

The Bureau of Standards, of Washington, exhibited some interesting testing machines and I had several opportunities of discussing the possibilities of plantation rubber with Mr. Doughty who represented the Department of Commerce and Labour. Mr. Doughty anticipated difficulty in getting exactly what he required for testing purposes, through dealers, and I agreed to assist him in this direction. Plantation is not, at present, officially recognised by the Navy or other departments of the American Government and has no place in their contract specifications.

The New York Commercial Co

This firm is one of the largest importers of crude rubber. The General Manager, Mr. A. W. Stedman, described the difficulties experienced in fulfilling contracts owing to the mixed condition in which plantation sorts arrive after repacking in Europe. He showed me one parcel of about 5 lbs in weight, containing 30 or 40 scraps of crepe of every conceivable shade. He assured me that this was a fair example of the conditions under which he is at present compelled to buy. Mr. Stedman strongly favours direct shipment from Malaya to New York and agrees with every buyer I spoke to in America as to the need of stamping all plantation rubber with the name of the estate or some other recognisable brand.

The United States Rubber Co.

Mr. Bass, who buys for the thirty factories belonging to this vast concern, told me that he was recently tendered some " smoked plantation sheet " which on examination proved to be an inferior African.

The Manhattan Rubber Co.

Mr. Wray and I were taken over the factory in New Jersey by Col. Arthur Townsend, President of the Company.

The famous " Condor " belting, fire hose and emery wheels, which are supplied to the British and other government arsenals, are among this Company's best known productions. They use a fair quantity of Plantation, but complain of the lack of uniformity and of the rubber being packed in rough cases, splinters from which adhere to the sheets. Like all other American manufacturers, before the Exhibition was held, they called all plantation rubber " Ceylon," and all smoked sheet " Highlands and Lowlands." Col.

Townsend took us to see his stock of crude rubber, and we found his sheet packed in rough unplaned cases, measuring about 60 cub. ft. I believe in this instance the sheet was produced by Highlands and Lowlands, but I assured him that no Malayan Estate, so far as I was aware, ever packed its rubber in such preposterous cases, and he must blame European dealers, who had repacked it, for the chips.

We spent some time in the Manhattan laboratory and saw the usual tests applied. Col. Townsend recommended that similar plants be established on estates. The plant recommended consists of the following :—

1. Acetone Extracting apparatus (for percentage of resin.)
2. Machine for testing tensile strength.
3. Mixing machine.
4. Vulcanizing plant.
5. Miniature washing plant.

The total cost of this would amount to about £600. If too expensive for one estate it might be worked by a group. In Col. Townsend's opinion this would prevent damage to rubber through using too much acetic acid or other coagulant, and "plantation" known to have been cured under a Chemist's supervision would command confidence and consequently a better price. He, himself, would be prepared to pay from 5 to 10 per cent over the current price if he were assured of its uniformity up to the following standard :—

Tensile Strength	...	Not less than 1,750 lb. per sq. in.
Stretch ,,	...	Not less than 6½ times.
Resin ,,	...	Not more than 2%.

I should explain that rubber is vulcanized by mixing with 10% of sulphur and then cured by subjection either to steam or dry heat. The actual thickness of the samples tested for tensile strength is ¼ by $\frac{1}{10}$ inch.

Fine hard Para is not absolutely uniform but it usually ranges between 2,000 and 2,400. Col. Townsend has found smoked sheet up to 2,100 lb.. and therefore his requirement of 1,750 as a minimum is not over-ambitious. The stretch is tested simultaneously. The proposed limitation in the quantity of resin is not a matter of much importance because the price could be reduced correspondingly if there is more than 2% present. The objection to resin is that the buyer is naturally unwilling to pay for a waste product.

The Gutta-Percha and India-Rubber Manufacturing Company of Toronto.

Like most of the other American factories, this old Canadian institution produces all kinds of rubber goods except toys. The

Company is old only in years. In every other respect it is up-to-date and progressive. The paid up capital amounts to only $200,000 (£40,000), but more than this sum has been expended on building extensions during 1912, out of profits.

The Company displays in the highest degree the care for the comfort of the well-paid, hard-working and contented employés, which is such a noticeable feature in the rubber factories of America.

I was conducted over the works by Mr. C. N. Candee, General Manager, and Mr. Street, Superintendent, by whom I was shown through rooms where 1,196 different patterns or styles of boots and shoes are made, most of which are turned out in a number of different sizes.

The Company uses only ¾ million pounds of crude rubber as against several times that quantity of reclaimed rubber, but as the demand for its tyres, shoes, hose, belting, etc., is rapidly increasing it will require much larger supplies of crude in the near future and is as interested as anyone in the development of the plantation industry.

Canadian Consolidated Rubber Co. of Montreal.

This is the largest rubber-manufacturing business in Canada, if not the largest in the Empire. It is proposed to raise the capital from $7,600,000 to $10,000,000 (gold), and it has spent during the past year $600,000 on extending its five factories. The consumption of crude rubber exceeds 3,000 tons per annum, and practically all the output is sold in Canada.

Mr. A. D. Thornton, Managing Director, showed me over the Montreal Works. The Company consumes large quantities of Guayule, which it finds at the present price of 63 cents, is after washing, about equal to Plantation at $1 (4*s.* 2*d.*) for most purposes.

In the Druggist Sundries Department nothing but Plantation is used. Water bottles, syringes, etc., contain no rubber but smoked sheet, while finger cots (stalls) are made of fine pale crepe. For air brake hose and in many other lines Guayule and Plantation are equally suitable.

The demand for fire hose in Canada, where new towns are constantly springing up, is enormous, and this Company produces up to 40,000 feet daily, worth about a dollar (4*s.* 2*d.*) a foot. Every foot length contains half a pound of rubber.

It will, I think, be of interest if I give a few examples of the compounds used in a factory. To begin with "rubbers" which, until they were recently surpassed by the tyre industry, were the largest line of consumption in America:—

Shoe Upper.

11 lb.	...	Fine Hard or Plantation
7 „	...	Medium Grade (Congo, etc.)
12 „	...	Litharge
12 „	...	Whiting
½ „	...	Lamp black
1½ „	...	Tar
½ „	...	Sulphur
45 „	...	Reclaimed Rubber

Shoe Soleing

11 lb.	...	Medium grade
75 „	...	Reclaimed
23 „	...	Whiting
9 „	...	Litharge
5 „	...	Tar
¾ „	...	Sulphur

The side of the boot or shoe requires more elasticity than the sole, hence the difference shown above.

Hot Water Bottles.

36 lb.	...	Smoked sheet
18 „	...	Floated whiting
9 „	...	Sulphuret Antimony

These formulae are given exactly as Mr. Thornton copied them out for me.

Imperial Wire and Cable Co. of Montreal.

I was shown over this most interesting factory by the superintendent, Mr. J. D. Hathaway. To give some idea of the magnitude of the works it is only necessary to say that 12,000,000 lb. of copper wire is used per annum, and 16,000,000 feet are produced per week. Of this only 3,000,000 feet are insulated with rubber; paper is preferred for telephone cables, rubber for electric light mains, etc.

Perhaps the most interesting thing I learnt on this occasion was that Mr. Hathaway had placed his first order for plantation rubber, since he visited the New York Exposition the previous week. He told me that no reading or hearsay could have aroused the same interest in the product as that inspired by his personal inspection of the fine exhibits in the Malaya and Ceylon courts.

GUAYULE.

Professor Lloyd of Montreal, who is a well-known expert on this Mexican rival of "Plantation," told me that within two years he anticipates natural exhaustion of this variety. Its production is so profitable, at present prices, that it is being cut out much faster than it can be replanted, and two years hence very little will be exported.

NOMENCLATURE COMMITTEE.

At the request of the Rubber Club of America the International Conference was invited to select a Committee to revise the trade names of all varieties of rubber.

The Committee consisted of Mr. H C. Pearson (Chairman), Dr. Huber and Dr. J. de Argollo (representing Brazil), Mr. Crosbie Rolls (Ceylon), Mr. Noel Trotter (R.G.A., London), Mr. Anderson (Hawaii), Messrs. Bass and Zeiss (Importers), and Mr. Leonard Wray and myself (British Malaya).

I submitted a scheme for plantation sorts which was unanimously accepted by the Committee after several hours' discussion.

Dr. Huber's revision of the nomenclature of all American varieties was still under consideration when I left New York. Both schemes will be submitted to the Executive of the Rubber Club, and if approved, it is proposed to invite their adoption by brokers and dealers of Mincing Lane and all Chambers of Commerce interested. Our object is to abolish, as far as possible, the misnomers that have crept into the trade and to adopt a scheme which will be comprehensible to manufacturers and producers alike.

CONCLUSION.

I am convinced that Mr. Staines Manders and those associated with him in organizing this, the Third International Exposition, have done a genuine service to the plantation industry, whereby we have been enabled to place our produce so prominently before our best customers. At the same time, the benefit is likely to be only of a temporary character unless we make up our minds to adopt some of the suggestions made to us by the manufacturers.

The lack of uniformity (the most serious charge) is ascribed to the use of harmful acids in coagulation and (or) to the mixing of all kinds of rubber by dealers while it is passing through their hands in Europe.

To avoid the former cause of complaint, the greatest care must be taken to keep the use of artificial coagulants to the lowest possible limit, if it cannot be eliminated entirely.

Half-a-dozen different specimens of acid (including nitric and sulphuric*) were exhibited in the Malaya Court and stated to be used for coagulation. Several manufacturers expressed their regret that such things should be used on estates, although it only

* So far as I know, these acids are not used in any factory in Malaya, and certainly will not be until they have been proved as inocuous as Acetic. See Bull. No. 17, Dept. of Agr., F.M.S., by B. J. Eaton, on experiments with different coagulants. Practically all the acid used in coagulation is eliminated in the preparation and washing of plantation rubber. [ED.]

confirmed the impressions they had already formed. They admitted they had detected no trace of acid in "Plantation," when tested at their factories, but did not accept this as proof that no damage had been done

The general opinion seemed to be that acetic acid if used in very small quantities is harmless, but that no other coagulant should be used in the bulk until it is proved harmless in the sample.

It is also very desirable to prevent the mixing of rubber in transit. Both the importers and manufacturers of America are in a mood to support our efforts but are helpless so long as we continue to ship unbranded rubber. At my request, Messrs. David Bridge & Co. of Manchester are now experimenting with a view to producing a hand stamp to perforate crepe as well as sheet. I look forward to the time when every Manager in Malaya who takes pride in his curing will stamp every piece of rubber produced, and I am confident that those who are not prepared to take this simple precaution will before long find their rubber classed among the mysterious packages which 'look like' Hevea sheet or crepe.

This is one step towards protecting the produce of reputable estates. The rest will come when European dealers realize that if they will not tranship our rubber in the original cases, direct shipment from Malaya to New York is inevitable.

I must express my appreciation of the kindness I received in the United States and Canada from all the leading representatives of the trade. The freedom with which manufacturers discussed every detail of their business and accorded their permission to use any information they gave me for this Report, is the best evidence that their experience with plantation rubber has been sufficiently satisfactory to encourage their desire to improve the acquaintance.

NOTICE.

On last page Vol. I, No. 5, Meteorological Readings in the various Districts of the F.M.S. for the Month of "November," 1912, read "October," 1912.

NOTES ON THE SINGAPORE MARKET FOR STRAITS PRODUCE DURING DECEMBER 1912.

Pepper—The quantity of Black Pepper offering has been small, but demand continues very quiet and business was done as low as $19\frac{1}{2}$, the price however recovering a little during the past few days, sellers now asking $20. Sarawak White Pepper is available only in trifling quantities, and the price has declined to $32.75. A moderate quantity of Sambas and Pulo Laut White Pepper has been sold at $33\frac{3}{4}$ to $34.

Gambier—Arrivals have been fairly heavy and the price declined to $7.60 at which buyers took considerable quantities, and the market has since advanced to $7.80. At current prices it is likely that consumption will increase, and the general impression seems to be that prices are more likely to advance than decline.

Copra—Owing to the existence of a somewhat heavy "bear" account and to reports of considerable damage to plantations in the Philippines caused by cyclones, prices have kept very steady, and show a moderate advance on last months quotations, values to-day being Bally $11.75, Kayong $11.40, Pulo 11.30 and Siantan $11.10.

Rubber—has been very steady during the month under review. Closing values are :—

Fine Pale Crepe	@	$241
No. 2 Crepe	@	$230
Smoked Sheet	@	$244
Unsmoked Sheet	@	$235
Scrap Sheet	@	$170/150

Tapioca—has gone easier and the market has been dull at $7.60 for Flake and $7 for Pearl.

Supplies are very trifling and business has been slow.

Nutmegs—Although home markets are weaker prices here keep fairly steady at $29 and $30 for 110s and 80s respectively. A good deal of speculation has recently been going on mostly on the Continent and markets have been irregular in consequence.

Sago Flour—has been at a higher level throughout the month and up to $4.0 5 was paid for ready parcels but towards the close the market has sagged away again and values cannot be quoted over $3/925 3/975 according to grade.

FEDERATED MALAY STATES.

Comparative Statement of Cultivated Rubber Exported during the Years 1912 and 1911.

Produced in	Exported during Nov. 1912.	Previously.	Total export during the year.	Export during similar period of previous year.	Increase.
	lbs.	lbs.	lbs.	lbs.	lbs.
Perak	944,709	8,347,908	9,292,617	4,942,676	4,349,941
Selangor	1,512,419	14,604,470	16,116,889	9,360,161	6,756,728
Negri Sembilan	637,393	4,872,415	5,509,808	3,211,623	2,298,185
Pahang	16,952	87,820	104,772	33,011	71,761
Total ...	3,111,473	27,912,613	31,024,086	17,547,471	13,476,615

Exported viâ	To United Kingdom.		To Continent of Europe.		To Ceylon.		To America.		Total.	
	Nov.	To date.	Nov.	To date.	Nov.	To date.	Nov.	To date.	Nov.	To date
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Port Swettenham	1,358,352	15,168,498	218,388	2,104,513	74,594	795,135	...	23,413	1,651,334	18,091,559

Note:— To Australia and Japan nil.

KUALA LUMPUR,
9th December, 1912.

E. S. HOSE,
Acting Commissioner of Trade and Customs, F.M.S.

Abstract of Meteorological Readings in the various Districts of Malaya for the Month of November, 1912.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bharu		141.19	79.1	84.50	74.03	10.47	77.3	.897	76.0	90.%	...	14.79	3.48
Malacca, Durian Daun Hos.	29.869	145.6	80.2	86.1	72.7	13.4	78.5	.935	...	88.	N.	4.31	1.00
N. Sembilan, Dist. Hospital Seremban	...	142.06	79.2	85.7	71.5	14.2	75.7	.834	73.6	84.	N. W.	10.85	1.91
,, Dist. Hos. K. Pilah	...	155.8	80.1	89.0	71.8	17.2	76.8	.860	74.6	82.	..	12.92	4.30
,, ,, Tampin	...	150.6	79.1	85 3	73.2	12.1	75.1	.797	72.5	80.	...	7.81	1.40
,, ,, P. Dickson	...	152 2	80.4	86.3	73.9	12.4	76.9	.856	74.5	81.	...	10.21	2.88
Pahang, ,, K. Lipis	...	...	79 6	88.0	67.7	20.3	77.1	...	...	...	...	9.26	2.68
Penang, ,, Penang	29.828	153.	80.9	92.	72.	20.	76.9	.852	74.	81.	...	9.50	2.96
Perak, ,, Taiping	...	105.	79.34	91.	71.	20.	76.9	.856	...	87.	...	17.64	3.02
,, ,, Ipoh	...	...	80.15	90.	69.	21.	75.77	.834	...	82.	...	12.51	3.30
,, ,, T. Anson	...	...	80.09	89.	69.	20.	76.78	.876	...	87.	...	9.81	1.50
,, ,, P. Buntar	...	...	80.58	89.	71.	18.	76.55	.860	...	82.	...	10.98	4.36
,, The Cottage	...	...	...	..	...	...	...	...	...	...	...	38.97	5.50
Selangor, General Hospital Kuala Lumpur	...	142.3	79.8	87.2	70.9	16.3	77.1	.828	74.7	82.	S. W.	8.97	1.23
,, Dist. Hos. Klang	...	...	...	84.9	68.2	16.7	...	...	...	...	...	8.57	1.50
,, ,, K. Selangor	...	...	...	88.4	69.2	19.2	...	...	...	...	...	6.43	2.55
,, ,, Rawang	...	...	...	88.2	68.9	19.3	...	...	...	...	...	14.61	2.96
Singapore, Kandang Kerbau Observatory	29.892	159.8	81.4	92.0	72.6	19.4	76.70	.870	...	82.	S.W.-N. W.	7.62	4.57